

explanation. It has been suggested that the radio-active emanation which is always present in the atmosphere in varying quantities may not be without influence on the human organism, and if, as Elster and Geitel suppose, this emanation is mainly derived from the underground air, which is more copiously discharged into the atmosphere as pressure decreases, it may be possible to establish a connection between the "storm feel" and the presence of radio-active emanation. If this be so we should expect to find the effect more pronounced with a falling than with a rising barometer, and, in the absence of direct measurements of the amount of emanation, the results obtained from a classification of the days, or perhaps better still, by a subdivision of the data used in constructing the present curves, on this principle would probably be interesting. Such a separation might prove profitable from a purely meteorological point of view, apart from all considerations of emanations, radio-active or otherwise. Possibly the peculiar abnormalities shown by most of the data for days of calm may be to some extent due to similar causes. The connection is, however, a very complicated one; attempts to trace a similarity between days of calm and days of low barometer fail signally.

We cannot here enter into a discussion of all the results or criticise the individual conclusions arrived at. In the final chapter Dr. Dexter further develops his thesis of the "available energy" and "emotional state" in the light of all the accumulated evidence, and comes to the conclusion that the effect of weather changes is greater on the former than on the latter, at any rate in its practical effects on conduct.

The study of the problems dealt with in the book is not without a certain practical interest to all who are responsible for the control of large numbers of individuals. If certain meteorological conditions can be shown to have a deleterious or beneficent influence on conduct or working capacity, it is well that we should recognise the fact as clearly as possible, and do what we can to mitigate the harmful conditions. Man cannot hope to control the weather, but he can modify the highly artificial conditions under which he lives to a very large extent.

A LIMNOLOGICAL MONOGRAPH.

Le Leman, Monographie Limnologique. By Prof. F. A. Forel. Vol. iii. Part ii. Pp. 410-715. (Lausanne: F. Rouge et Cie., 1904.)

IN the issue of this, the second part of his third volume, Prof. Forel completes his great monographic study of the Lake of Geneva. The veteran pioneer of scientific limnological research is to be congratulated on the successful termination of his monumental task, commenced some half-century ago.

The impetus which the study of lakes has received from the labours of Forel has now carried us so far that we find it difficult to realise the arduous nature of the work accomplished by him, who had in so many different directions to make the first tentative trials of methods of research with which all students of limnology are now familiar. The completed work is not merely a compendious study of the Lake of

Geneva, but is besides of the utmost value as a general study of the nature of fresh-water lakes. In his painstaking study of this one lake he has been so fortunate as to observe and explain in a satisfactory manner many phenomena of general scientific interest and importance, among others the mysterious rise and fall of the waters of the lakes now known as seiches, the peculiar abyssal fauna of the lake, &c.

The present part of the work, which is mainly historical, deals with such varied subjects that it is difficult to particularise. Nothing having the slightest connection, direct or indirect, with the Lake of Geneva is destitute of interest for Prof. Forel, and we find here discussed many questions which a less enthusiastic limnologist might have been content to leave to students of other departments of knowledge. He gives a *résumé* of the history of the surrounding countries, of legislation, the fluctuations of population, local traditions, &c. More particularly apposite to the subject are the history of the lake dwellings, undertaken fifty years ago, in company with a band of archæologists of which he laments that he is the only survivor, the history of navigation, of fishing, and of pisciculture.

The history of navigation is treated very fully, from the canoe of the lake dweller to the modern steamer, and is illustrated with reproductions of many ancient pictures of ships; with such fulness of detail is the subject treated that we have a list of steamers plying on the lake from the *Guillaume-Tell* of 1823 to those of the present day.

The ancient tradition of the "éboulement du Lauredunum" is discussed in its scientific bearings. The tradition, supported by contemporary chronicles, is that in the year 563 A.D. a mountain was precipitated into the lake, destroying a castle, villages and churches, causing a flooding of the shores of the lake, and much destruction of property and life in Geneva. He shows that a landslip, such as has occurred several times in history, could not account for the production of great floods. Although he has abandoned the belief that earth movements habitually produce seiches, he admits that a great earthquake might be the cause of the land-slide, and coincidentally of a great seiche, which would cause destruction on the shores of the lake. He thinks it more probable, however, that at a time of ordinary flood, when the waters of the lake were very high, an ordinary seiche of no more than a metre of amplitude might cause considerable flooding in Geneva, and perhaps wash away some wooden bridges and houses, the connection with the landslip being a mere coincidence.

In his philosophical reflections at the conclusion of his work, Prof. Forel claims that there have been few problems presented to him in the course of his investigations which he has not been able to solve, and the more difficult of these few are general problems, not belonging to his special province, and the solution of which must be sought in other lakes. He would, however, guard against this assertion being misunderstood as a boastfully complacent assumption that he has exhausted the subject. Every naturalist has his limits, determined from within by the extent of his powers, from without by the state of the

sciences in the age in which he lives. What is accomplished in one generation is the foundation for the achievements of the next.

That the subject is not exhausted we may easily see by remarking the progress that has been made in one of its departments most easily reviewed, since Prof. Forel finished that part of his work. In biology, even in the simple cataloguing of the lacustrine animals and plants, it is obvious that the work accomplished under his guidance is no more than a beginning in this direction, and specialists in any branch find abundance still to do. It is with no intention of belittling the work of Prof. Forel that this aspect of the subject is adverted to. It is a great work patiently carried through, and will serve as a foundation for all future limnological studies.

HENRY SIDGWICK'S ESSAYS.

Miscellaneous Essays and Addresses. By Henry Sidgwick. Pp. vii+371. (London: Macmillan and Co., Ltd., 1904.) Price 10s. net.

IN this volume we have the first instalment of the shorter essays of that brilliant thinker, Henry Sidgwick. They have been chiefly collected from journals and reviews, but two are now published for the first time. His philosophical lectures and papers are reserved for a companion volume. In a way, the selection of articles now before us illustrates a period of thirty-six years of the life of one of the most striking personalities of our time, and on that account, and from their breadth of view, they have a value even though the occasion of their appearance is long past.

Of the sixteen papers, six are literary or critical, six deal with questions of socialism and economics, and four with education and university affairs. We were surprised and somewhat disappointed to find no reminiscence of his activity in connection with the education of Englishwomen, but perhaps more may be expected when the histories of Newnham and Girton come to be written.

A detailed review of the essays on Shakespeare, Matthew Arnold, and Clough, or of those on political economy or sociology, hardly falls within the sphere of this Journal, but few of our readers who are interested in the burning question of the best education for men of science will regret having read Sidgwick's essay on "The Theory of Classical Education," reprinted from F. W. Farrar's "Essays on a Liberal Education," which was originally published in 1867. In the light of the recent controversy on the Greek question much of this excellent paper reads as if it had been written yesterday, and it is difficult to avoid the reflection that if several of the writers of controversial letters to the *Times* had read this essay of forty years ago, both their matter and manner might have been improved.

With respect to the classical element in a scientific education, Sidgwick was of opinion that although science had at length broken its connection with what was so long the learned language of Europe, yet everyone who aspires to become a "learned" man of science will require to read Latin with ease, but that

the sole stock-in-trade of Greek necessary for him would be a list of words that he could learn in a day and the use of a dictionary that he might acquire in a week. In other words, he appeared to be in favour of the retention for the highest class of science students of that modicum of Greek which is at present compulsory at Oxford and Cambridge, only he would perhaps have liked to see it reduced and treated as a distinct part of the direct teaching of English.

A clear distinction is drawn between natural and artificial educations, and between the effects of literary and of scientific training. With regard to the latter Cuvier's famous remark is quoted with approbation:—

"Every discussion which supposes a classification of facts . . . is performed after the same manner; and he who has cultivated this science merely for amusement, is surprised at the facilities it affords for disentangling all kinds of affairs."

He admits that a student of languages could not honestly claim an analogous advantage for his own pursuit. The editors are justified in the inclusion of the essay on "Idle Fellowships" in spite of the fact that the evils of which it complains have greatly diminished. The general educational considerations discussed are of so wide a bearing that they are not less true now than in 1876, when the essay was published.

We feel certain that those who peruse this volume will share our gratitude to the editors for their share in the re-publication.

OUR BOOK SHELF.

The Insulation of Electric Machines. By H. W. Turner and H. M. Hobart. Pp. xvi+297. (London: Whittaker and Co., 1905.) Price 10s. 6d. net.

THE perfecting of the modern dynamo electric machine, and the necessity of high potential differences have within recent years quite altered our ideas about insulation. Electrical engineers have come to view the subject from a different standpoint on account of the importance of disruptive strength of the material apart from conduction pure and simple. The book under review appears at a very appropriate time. Our knowledge of the physical properties of insulators is now sufficient, and the want of a really good book on the subject is great enough to justify its appearance. It will be welcomed by the electrical engineer as a most valuable addition to his library.

The book opens with an account of the requisites for insulating materials, and the most perplexing phenomena met with during the testing of the same. Why is it that air has comparatively such low dielectric strength, and yet it is a very good insulator as ordinarily understood? Again, why does the apparent dielectric strength per unit thickness of such a substance as mica vary with the thickness? These and many other matters difficult to understand are laid before the reader. The properties of insulating materials and the influences of temperature and moisture upon them are next dealt with. The authors quite rightly lay stress upon the testing of insulators at, or even exceeding, their working limits of temperature, and the futility of baking to obtain temporary insulation unless moisture be permanently excluded. When dealing with the influence of brush discharge mention might with advantage have been made of the production of nitric acid, and the ultimate